

# **THUNDERATION**

## **SERVICE MANUAL**

**BROMLEY INCORPORATED**

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P/NR140-900-000

Switch	5	6	Number of hits to get Bonus.
	off	off	First hit
	on	off	Second hit
	off	on	Third hit
	on	on	Fourth hit
Switch	7		Index Sensor type.
	off		Slotted.
	on		Reflective.
Switch	8		Attract sounds (no effect on game sounds).
	off		Attract sounds OFF.
	on		Attract sounds ON.

DIP switch settings for "Thunder".

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Sat 22-Dec-2001 07:20:00

Revised Tue 22-Oct-2002 09:15:39

Software version 1.7 10-22-02

Score table values

(upper line cooresponds to wheel locations 1-14 and  
lower line cooresponds to wheel locations 15-28)

BNS,07,03,15,03,07,10,25,03,05,09,03,10,05 ;Table\_0 Bonus worth 6  
BNS,07,03,15,03,07,10,25,03,05,09,03,10,05 ; Quarter 1

BNS,05,03,12,03,06,08,20,03,04,07,03,08,04 ;Table\_2 Bonus worth 5  
BNS,05,03,12,03,06,08,20,03,04,07,03,08,04 ; Quarter 3

BNS,03,02,08,01,03,05,14,01,03,05,01,05,03 ;Table\_7 Bonus worth 2  
BNS,03,02,08,01,03,05,14,01,03,05,01,05,03 2 cent ticket 2

Sun 06-Jan-2002 09:45:52

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Revised Tue 22-Oct-2002 09:15:39

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OPERATION NOTES:

At power-up both coin units are locked out until the calibration mark is found for both wheels. The display shows "CAL Find" while in this state. It should not take more than 2 revolutions of both wheels to begin normal operation.

Battery Backed Memory.

Several game operating parameters are stored in a section of RAM which is powered by a backup battery pack. At power-up the control software checks that the data in this area is valid and reloads default values if the data is found to be corrupt. To manually load the default values remove power and batteries from the game. Allow at least 30 seconds for to the capacitors to discharge then reinstall the batteries and apply power to the game.

Front Controls.

Revised Fri 2-May-2003 18:15:39

Software version 1.7a

DIP switch bank 0 (labeled DIP1 on PCB).

```
=====
Switch  1    2    3    Initial Bonus amount
-----
        off off off    5
        on  off off    10
        off on  off    15
        on  on  off    20
***     off off on    25
        on  off on    30
        off on  on    35
        on  on  on    40
=====
```

```
=====
Switch  4    5    6    Bonus limit
-----
***     off off off    999
        on  off off    50
        off on  off    60
        on  on  off    75
        off off on    100
        on  off on    150
        off on  on    175
        on  on  on    200
=====
```

```
=====
Switch  7                Single "Stop" mode?
-----
***     off                No                Stop allowed for each coin dropped.
        on                 Yes                1 stop allowed for a batch of coins.
=====
```

```
=====
Switch  8                Divide payout by 2?
-----
***     off                No
        on                 Yes
=====
```

Revised Fri 2-May-2003 18:15:39

Software version 1.7a

DIP switch bank 1 (labeled DIP2 on PCB).

```
=====
Switch  1    2    3    Payout table select. See tables below for amounts.
-----
***     off off off    Table_0
        off on  off    Table_2
        on  on  on    Table_7
=====
```

```
=====
Switch  4                Bonus power up reset.
-----
***     off                Bonus amount not reset when power applied.
        on                 Bonus re-initialized when power applied.
=====
```

Volume up and down buttons are located inside the front coin door. Each time either of the buttons is pushed a reference sound is played to help evaluate the volume change.

#### Ticket Clear.

This button is located beside the volume controls and is used to clear the ticket display and thus tickets to be dispensed to zero. This is used mainly to help with game test out at the factory but may be of some use in the field.

#### Special Utilities.

To enter Special Utilities push and hold Stop 1 and tap the Ticket Clear button. Each push of Ticket Clear cycles to the next utility. Each subsequent push of Ticket Clear advances to the next function or test and finally exits back into normal game operation at the 7th push. To prevent the game from becoming stuck in these utilities it will also automatically exit these functions after a couple of minutes if the Ticket Clear button is not pushed.

#### Lamp Test (Upon entry into utilities).

All LED segments are lit. This utility times out after 30 seconds and returns to normal game operation to protect the driver chips from overload.

#### Average Payout Statistics (First push of Ticket Clear button).

The value shown in the "Bonus" area is the average percentage paid out and is based on 25 cent play and 1 cent tickets. The value in the left "Sparks" area is the average tickets per coin issued.

Pushing the Volume Down button while the payout statistics are being displayed resets the payout variables. Please note that immediately after a reset the values displayed are meaningless since a divide by zero will have been performed. After the first coin is dropped correct values are displayed however.

#### Simulate Ticket Mode (Second push of Ticket Clear button).

Demo mode where tickets are not dispensed but the game operates as if they are. The Bonus display indicates the current state as yes or no. Demo mode is enabled with the Volume Down button or disabled with the Volume Up button. This mode requires that both the Ticket Dispensers be unplugged.

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#### Bonus Operartion (Third push of Ticket Clear button).

Turn on or off Bonus increment.

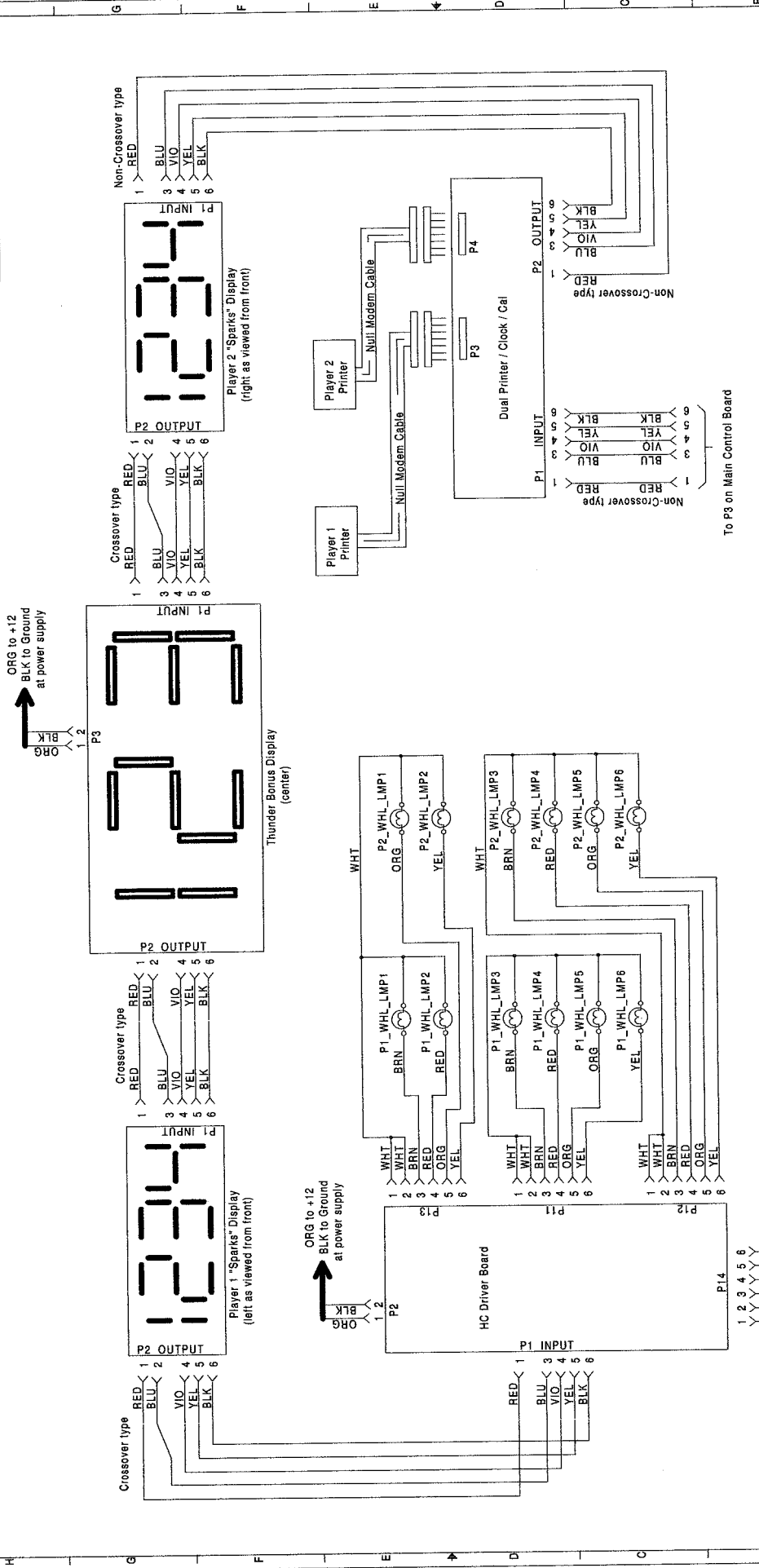
The display indicates current operating state. Yes means that the bonus amount is incremented with each coin inserted. No means that the bonus amount remains fixed.

#### Adj (Fourth push of Ticket Clear button).

Stops both wheel motors and lights lamps when index is detected by sensor.

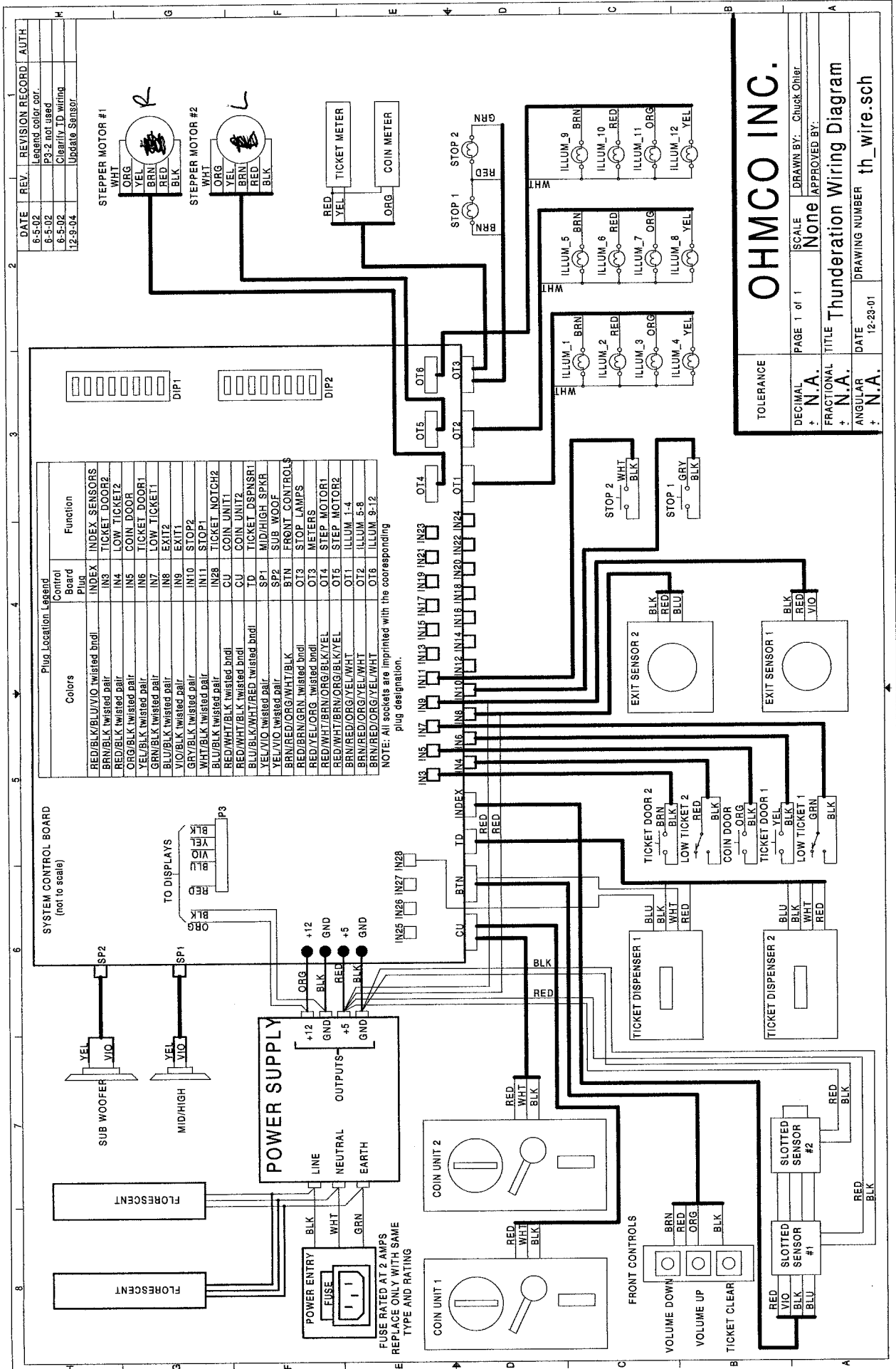
#### Return to normal (Fifth push of Ticket Clear button).

DATE	REV.	REVISION RECORD	AUTH.
2-17-02		Add HC Driver	C.O.
4-17-02		Add Logic Light	C.O.
10-28-02		Add Dual Printer	C.O.



TOLERANCE		OHMCO INC.	
DECIMAL	PAGE 1 of 1	SCALE	DRAWN BY: Chuck Olier
+ N.A.		None	APPROVED BY:
FRACTIONAL	TITLE Thunder Display Wiring		
+ N.A.	DATE	DRAWING NUMBER	
ANGULAR	12-26-01		th_dspl.sch
+ N.A.			

To P3 on Main Control Board



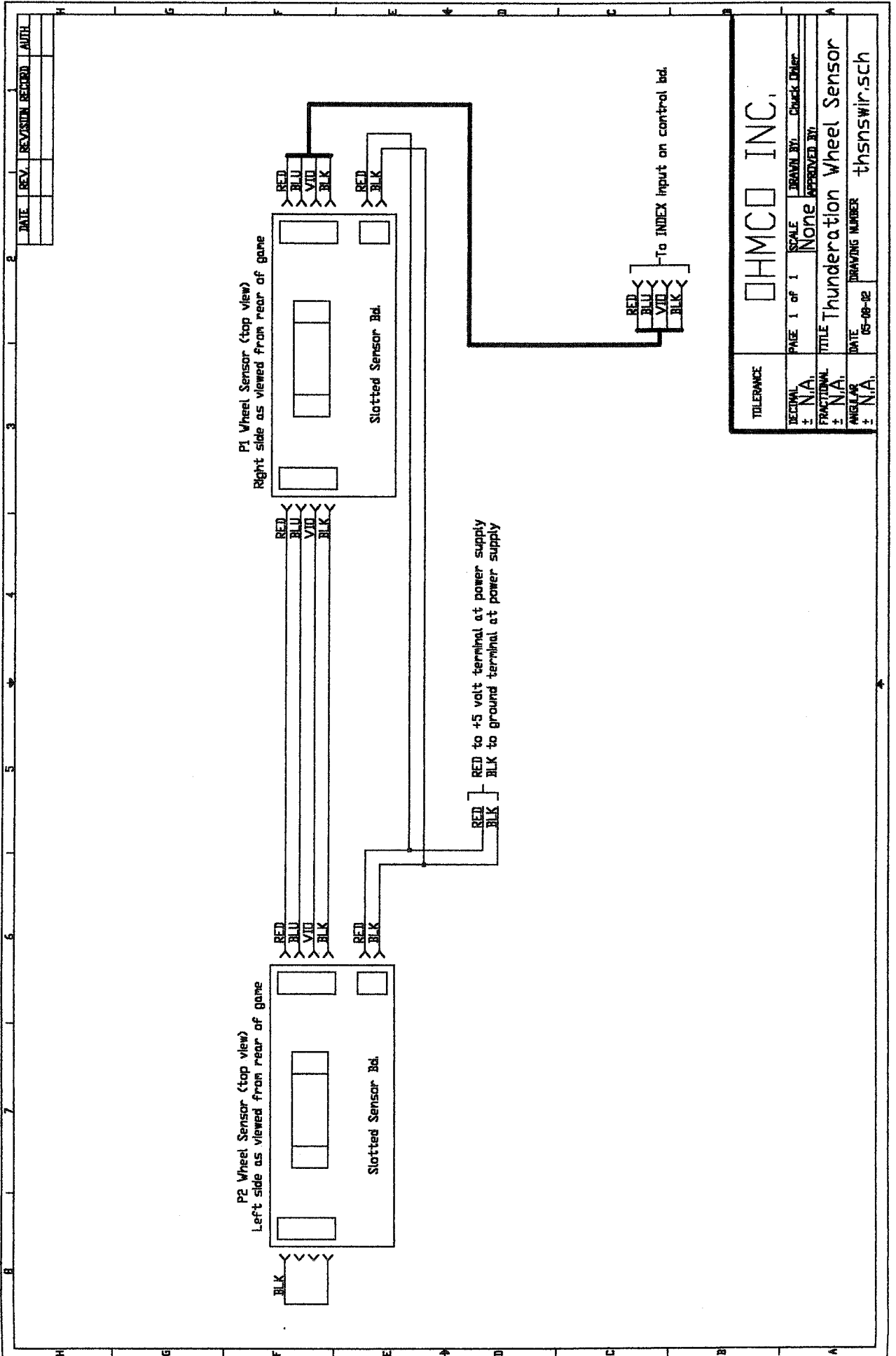
DATE	REV.	REVISION RECORD	AUTH.
6-5-92		Legend color cor.	
6-5-92		P3-2 not used	
6-5-92		Clarify TD wiring	
12-9-94		Update Sensor	

Control Plug	Colors	Function
IN1	RED/BLK/BLU/VIO twisted brndl	INDEX
IN2	BRN/BLK twisted pair	INDEX
IN3	RED/BLK twisted pair	TICKET DOOR2
IN4	ORG/BLK twisted pair	LOW TICKET2
IN5	YEL/BLK twisted pair	COIN DOOR
IN6	GRN/BLK twisted pair	TICKET DOOR1
IN7	BLU/BLK twisted pair	LOW TICKET1
IN8	WHT/BLK twisted pair	EXIT2
IN9	GRY/BLK twisted pair	EXIT1
IN10	WHT/BLK twisted pair	STOP2
IN11	BLU/BLK twisted pair	TICKET NOTCH2
IN12	RED/BLK twisted brndl	CU
IN13	RED/BLK twisted brndl	CU
IN14	BLU/BLK/WHY/RED twisted brndl	TICKET DSPN SR1
IN15	YEL/VIO twisted pair	MID/HIGH SPKR
IN16	WHT/VIO twisted pair	SUB WOOF
IN17	BRN/RED/ORG/WHT/BLK	BTN
IN18	RED/BRN/GRN twisted brndl	STOP LAMPS
IN19	RED/VEL/ORG twisted brndl	OT3
IN20	RED/WHT/BRN/ORG/BLK/YEL	METERS
IN21	RED/WHT/BRN/ORG/BLK/YEL	OT4
IN22	BRN/RED/ORG/YEL/WHT	STEP MOTOR1
IN23	BRN/RED/ORG/YEL/WHT	STEP MOTOR2
IN24	BRN/RED/ORG/YEL/WHT	ILLUM 1-4
IN25	BRN/RED/ORG/YEL/WHT	ILLUM 5-8
IN26	BRN/RED/ORG/YEL/WHT	ILLUM 9-12

NOTE: All sockets are imprinted with the corresponding plug designation.

**OHMCO INC.**

TOLERANCE	SCALE	DRAWN BY: Chucky Olier
DECIMAL	PAGE 1 of 1	APPROVED BY:
+ N.A.	None	
FRACTIONAL	TITLE Thunderation Wiring Diagram	
+ N.A.	DRAWING NUMBER	th_wire.sch
ANGULAR	DATE	12-23-01
+ N.A.		

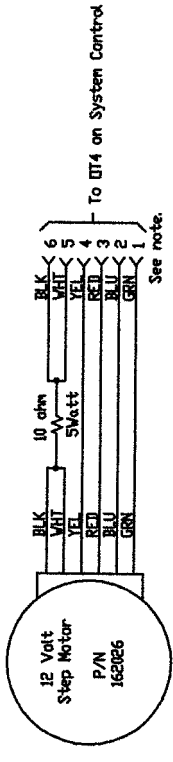


DATE	REV.	REVISION REQUIRED	AUTH.

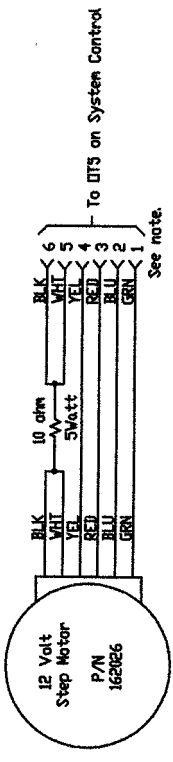
TOLERANCE	DHMCO INC.		
DECIMAL	PAGE 1 of 1	SCALE	DRAWN BY: Chuck Olier
± N/A		None	APPROVED BY:
FRACTIONAL	TITLE Thunderation Wheel Sensor		
± N/A	DATE	DRAWING NUMBER	thsnswir.sch
ANGULAR	05-08-02		
± N/A			

DATE	REV.	REVISION	RECORD	AUTH.
1-21-03	b	SHOW AMP	DR. KAW.	

Player #1 Wheel Motor



Player #2 Wheel Motor

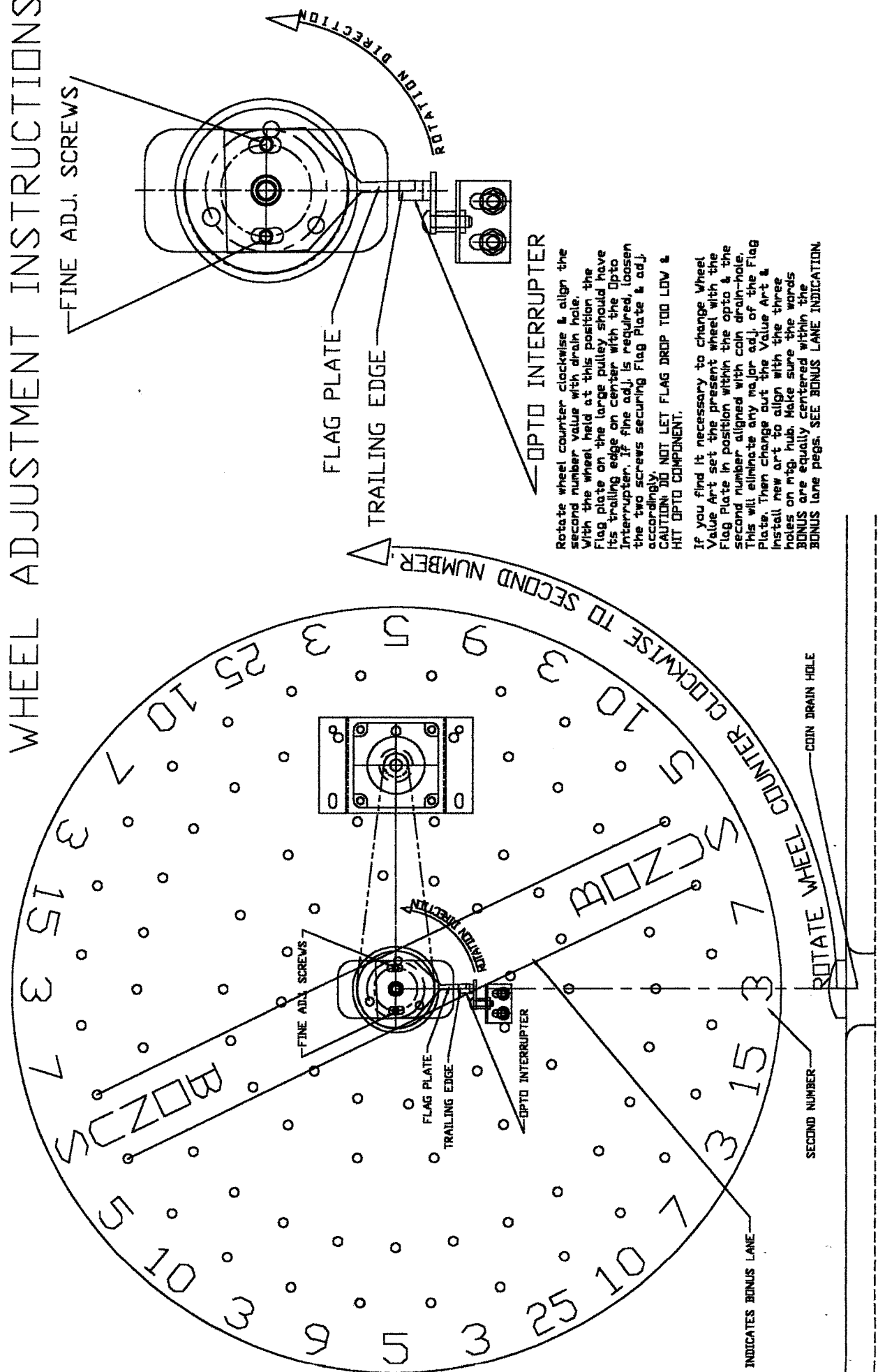


NOTE:  
Pin numbering shown is embossed on AMP MTA type connector body.

TOLERANCE	OHMCO INC.			
DECIMAL	PAGE 1 of 1	SCALE	DRAWN BY:	Checked Other
± N/A.		None	APPROVED BY:	
FRACTIONAL		Thunderation		
± N/A.		12 volt stepper motor		
ANGULAR	DATE	DRAWING NUMBER		
± N/A.	11-30-02	th_12vlt.sch		



# WHEEL ADJUSTMENT INSTRUCTIONS



Rotate wheel counter clockwise & align the second number value with drain hole. With the wheel held at this position the Flag plate on the large pulley should have its trailing edge on center with the Opto Interrupter. If fine adj. is required, loosen the two screws securing Flag Plate & adj. accordingly.  
**CAUTION: DO NOT LET FLAG DROP TOO LOW & HIT OPTO COMPONENT.**

If you find it necessary to change Wheel Value Art set the present wheel with the Flag Plate in position within the opto & the second number aligned with coin drain-hole. This will eliminate any major adj. of the Flag Plate. Then change out the Value Art & install new art to align with the three holes on mtg. hub. Make sure the words **BONUS** are equally centered within the **BONUS** lane pags. SEE **BONUS** LANE INDICATION.

—FINE ADJ. SCREWS

FLAG PLATE

TRAILING EDGE

—OPTO INTERRUPTER

ROTATION DIRECTION

ROTATE WHEEL COUNTER CLOCKWISE TO SECOND NUMBER

—FINE ADJ. SCREWS

FLAG PLATE

TRAILING EDGE

—OPTO INTERRUPTER

WHEEL NUMBER

—COIN DRAIN HOLE

SECOND NUMBER

INDICATES BONUS LANE

ROTATE WHEEL COUNTER

## THUNDERATION - PARTS LIST

MAIN CPU PCB	P/N R140-901
LAMP DRIVER PCB	P/N R140-902
BONUS DISPLAY / 3 DIGIT PCB	P/N R140-903
SPARKS DISPLAY / 4 DIGIT PCB	P/N R140-904
EXIT SENSOR PCB	P/N R140-905
WHEEL SENSOR PCB / SLOTTED	P/N R140-906
ROPE LIGHT / 12FT.	P/N R140-051
FLASHER LAMPS	GE #555 / GE #259 / GE #147 GE #159
WHEEL BACK LAMPS	# 89 WEDGE BASE
MOTOR	STP57D317
DRIVE BELT	A6G3-080037
POWER SUPPLY	U-SAN POWER MODEL# UP50T Or # UP-51T
MARQUEE ART	R140-503
FRONT GLASS SIZE:47.4X24.13X3/16	R140-500
SERVICE MANUAL	R140-900
PEGS	R140-303-000

## **SERVICE NOTICE / PEGS**

**IF YOU HAVE PEGS THAT COME LOOSE THEY WILL FALL INTO THE CASH BOX.**

**PROVIDED HERE IS A TUBE OF LOCTITE 4210 INSTANT ADHESIVE.**

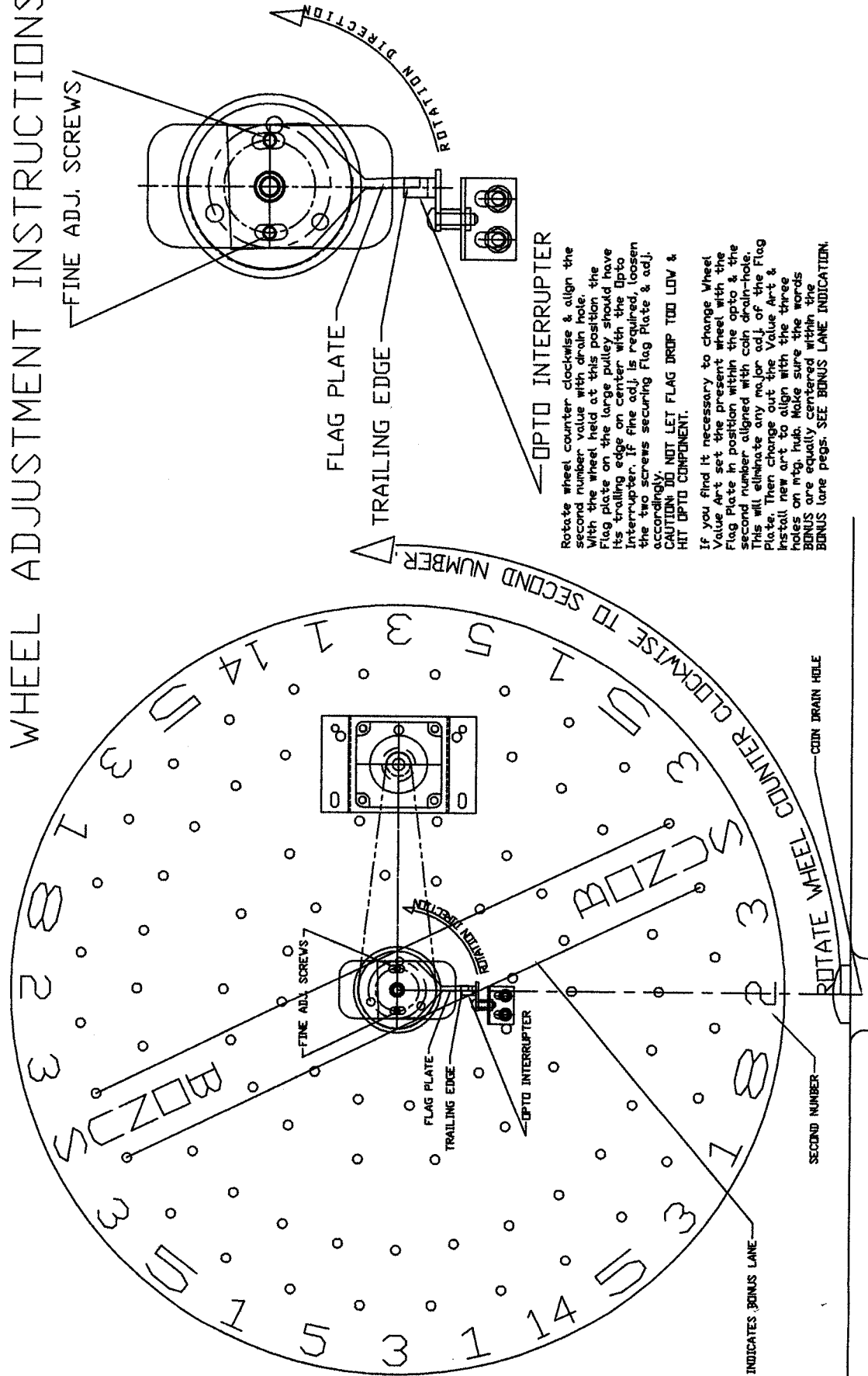
***A FEW PEGS OFF THE WHEEL WILL NOT HAMPER PLAY, BUT IF SEVERAL COME OUT, COLLECT THEM FROM THE CASH BOX AND WITH JUST A SMALL DAB, COMPLETELY AROUND THE KNURLED PORTION OF THE PEG WITH LOCTITE 4210, INSERT WITH A TWISTING MOTION UNTIL SEATED AGAINST SHOULDER OF PEG.***

**RECOMMEND DOING THIS AT THE END OF DAYS OPERATION SO THE ADHESIVE HAS OVERNITE TO DRY, EVENTHOUGH DRYING TIME IS FAST.**

**SHOULD YOU NEED ADDITIONAL PEGS PLEASE CONTACT OUR SERVICE DEPT. AT 847/427-0639**

# CEC THUNDERATION

## WHEEL ADJUSTMENT INSTRUCTIONS



Rotate wheel counter clockwise & align the second number value with drain hole. With the wheel held at this position the Flag plate on the large pulley should have its trailing edge on center with the Opto Interrupter. If fine adj. is required, loosen the two screws securing Flag Plate & adj. accordingly.  
**CAUTION! DO NOT LET FLAG DROP TOO LOW & HIT OPTO COMPONENT.**

If you find it necessary to change Wheel Value Art set the present wheel with the Flag Plate in position within the coin drain-hole. This will eliminate any major adj. of the Flag Plate. Then change out the Value Art & install new art to align with the three holes on mtg. hub. Make sure the words BONUS are equally centered within the BONUS lane pegs. SEE BONUS LANE INDICATION.